

25218 - Soil degradation and pollution

Información del Plan Docente

Academic Year	2016/17
Academic center	201 - Escuela Politécnica Superior
Degree	277 - Degree in Environmental Sciences
ECTS	6.0
Course	2
Period	Second Four-month period
Subject Type	Compulsory
Module	---

1. Basic info

1.1. Recommendations to take this course

This subject is offered in the [English Friendly](#) form

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

The preferred methodology in the theoretical and practical classes will be affirmative, combining an expositive and a demonstrative method. The expositive method, which is characterized by the communication of concepts, will be used when students do not have prior knowledge that allow participatory debate, or in the case of concepts or relationships requiring a formal precision. The demonstrative method is marked by demonstrating a task or a procedure, and will be used in practice tasks.

25218 - Soil degradation and pollution

For the students, it is recommended as learning methods the interrogative method, by asking the teacher or trying to find answers to his questions, and the active method, becoming the agent of his own formation through personal research, direct contact with reality and experience with the working group in which he is incorporated.

5.2.Learning activities

1. Theoretical sessions. Expositive and participatory lectures that will be followed by exercises and discussion topics.
2. Seminars and laboratory practices. Demonstrative and interrogative activities essentially aimed to dominate laboratory and field procedures.
3. Field task. Field work carried out during the second half of the course, and focused to the consolidation and expansion of concepts.
4. Non contact activities. Study and application of the topics covered by the schedule, preparation of practices' reports, conduct of a group work, preparation of exams...

5.3.Program

Theory programme

Block 1. The soil as a resource: its knowledge and protection

1. Soil and landscape. Soil as a natural, social and economic resource. Soil functions in the ecosystems. Soil use changes. Degradation processes.
2. Legislation and international agreements on the protection of soils. Convention against desertification. European Thematic Strategy on soil protection.
3. Soil cartography and geographical information.
4. Soil evaluation.

Block 2. Soil degradation processes and conservation practices

1. Soil degradation processes. Soil quality assessment and degradation status. Soil quality indicators. Sustainable degradation rate.
2. Physical degradation. Soil structure degradation: compaction, crust forming, soil sealing... Preventive and restoration methods.
3. Soil erosion. Rainfall erosivity and soil erodibility. Soil erosion models. Preventing and controlling erosion. Bioengineering methods.
4. Water and salts management. Water conservation practices. Irrigation and drainage. Salinisation. Management of saline and alkaline soils.
5. Soil organic matter management. Carbon sequestration, land use and cover change. Soil C stock. Organic wastes

25218 - Soil degradation and pollution

recycling through soil.

6. Soil pollution. Causes and consequences of soil pollution. Spanish legislation on polluted soils. Generic reference levels.
7. Ecotoxicology. Discussion of non effect (PNEC) and environmental (PEC) concentrations. Ecotoxic risk.
8. Over-fertilization and agrochemicals. Soil nutrients dynamics and availability. Good agricultural practices (GAPs). Persistence and dynamics of pesticides.
9. Potentially toxic elements. Heavy metals in soils: origin, dynamics, and availability.
10. Potentially toxic substances. Organic pollutants: origin, dynamics and persistence.
11. Treatment of polluted soils. Control and monitoring.

Block 3. Ecological restoration

1. Basis of the ecological restoration. Restoration goals. Definition of the final use of the restored areas. Methodological issues. Spatial and temporal planning. Quality indicators of restoration.
2. Wildfires and ecological restoration. Main effects of fire on soil attributes. Plant dynamics after fire. Soil erosion and plant recovery.
3. Ecological restoration of opencast mine sites. Technosols. Soil restoration evaluation.

Practice tasks programme

1. Scientific documentation (with the collaboration of the School library)
2. Effect of soil physical attributes on seed germination and growth.
3. Microbial reduction of soils.
4. Soil organic matter mineralization in aerobic conditions.
5. Soil pH regulation and management.
6. Structural stability of soil aggregates.
7. Soil erodibility (rainfall simulation).
8. Soil salinity.
9. Transport of fluid pollutants through soil.
10. Field trip. Soil conservation and degradation processes in Aragón.

5.4.Planning and scheduling

It is estimated that an average student should devote to this subject, 6 ECTS, a total of 150 hours. This time must include both classroom and non-attendance activities. The student must ensure that the dedication is distributed evenly throughout the quarter.

The basic pattern for classroom and laboratory activities is composed by four weekly hours. Nevertheless, this pattern should be modified by non school days, field trips or by other academic activities. These changes will be announced in classroom and also through the moodle e-learning campus.

5.5.Bibliography and recommended resources

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25218 - Soil degradation and pollution

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